CLAIMS

1. A low pressure processing system comprising an exhaust passage connected to a reaction vessel, and a gate valve that hermetically closes the exhaust passage by pressing a valving element against a valve seat to contact the same, said apparatus being adapted to process a substrate contained in the reaction vessel by a predetermined treatment by supplying a process gas into an interior of the reaction vessel while maintaining an atmosphere of a reduced pressure in the interior of the reaction vessel by evacuating the same through the exhaust passage, said system further comprising:

at least one purge gas supply port opening into a gap between the valving element and the valve seat; and

a purge gas supply passage through which a purge gas is supplied to the purge gas supply port.

2. The low pressure processing system according to claim 1, wherein said at least one purge gas supply port includes a first purge gas supply port opening into an area beside a face, to be in contact with the valving element, of the valve seat, and a second purge gas supply port opening into an area beside a face, to be in contact with the valve seat, of the valving element.

3. The low pressure processing system according to claim 1, wherein the valve seat has a ring shape, and at least one purge gas supply port includes a plurality of purge gas supply port arranged circumferentially.

4. The low pressure processing system according to any one of claims 1 to 3 further comprising:

a purge gas valve arranged in the purge gas supply passage to supply and stop supplying the purge gas; and

a controller configured to control the valve so that the purge gas valve is opened to supply the purge gas when the interior of the reaction vessel is supplied with the process gas.

5. The low pressure processing system according to any one of claims 1 to 3, wherein the gate valve is configured so that a size the gap can be adjusted to control pressure in the reaction vessel.

6. The low pressure processing system according to any one of claims 1 to 3, wherein the process gas is such that a reaction product of the process gas is unavoidably deposited on an inner surface of the exhaust passage even if the exhaust passage is heated.

7. A low pressure processing method of performing a low pressure process by using a low pressure processing system including an exhaust passage connected to a reaction vessel, and a gate valve that hermetically closes the exhaust passage by pressing a valving element against a valve seat to contact the same, said method comprising:

supplying a process gas into an interior of the reaction vessel while maintaining an atmosphere of a reduced pressure in the interior of the reaction vessel by evacuating the same through the exhaust passage, thereby processing a substrate contained in the reaction vessel by a predetermined treatment; and

supplying a purge gas, from at least one purge gas supply port opening into a gap between the valving element and the valve seat of the gate valve, into the gap.

8. The low pressure processing method according to claim 7, wherein the supplying of the purge gas includes supplying the purge gas from a first gas supply port along a face, to be in contact with the valving element, of the valve seat, and supplying the purge gas from a second gas supply port along a face, to be in contact with the valve seat, of the valving element.

9. A pressure control valve, for installation in a gas passage to which a solid matter possibly adheres, configured to perform a pressure control operation by adjusting a gap between a valving element and a valve seat, said pressure control valve comprising:

at least one purge gas supply port opening into a gap between the valving element and the valve seat; and

a purge gas supply passage through which a purge gas is supplied to the purge gas supply port.

10. The pressure control valve according to claim 9, wherein said at least one purge gas supply port includes a first purge gas supply port opening into an area beside a face, to be in contact with the valving element, of the valve seat, and a second purge gas supply port opening into an area beside a face, to be in contact with the valve seat, of the valving element.

11. The pressure control valve according to claim 9 or 10, wherein the valve seat has a ring shape, and al least one purge gas supply port includes a plurality of purge gas supply port arranged circumferentially.